Global Tropospheric Experiment Pacific Exploratory Mission-Tropics A (PEM Tropics A) Langley ASDC Data Set Document

Summary

This document provides information on data products obtained during the GTE Pacific Exploratory Mission-Tropics A atmospheric science expedition conducted over the tropical Pacific during August-September 1996. The major objective of the mission was to understand the factors controlling tropospheric ozone and its precursors (NOx, CO and hydrocarbons) over the South Pacific, and to assess the implications for the global oxidizing power of the atmosphere. There was also a need to improve understanding of atmospheric sulfur chemistry over the Pacific. Measurements were made primarily by investigators' instruments located on the NASA DFRC DC-8 and WFF P-3B (PDF) airplanes. Also provided are a list of principal investigators, a brief summary of measurement techniques and a list of publications. PEM-Tropics A was the first of two studies in the South Tropical Pacific region conducted through the GTE Project Office at NASA's Langley Research Center. The second study, PEM-Tropics B, was conducted during the March - April 1999 time period. Data from PEM-Tropics B is also available through the Langley ASDC.

This document provides information for the following PEM Tropics A data sets: (XX indicates the DC-8 or P-3B flight number.)

DC-8 Aircraft:

gte_pemta_dc8mXX.zip:	Aircraft Data
gte_pemta_dc8trajmXX.zip:	Backward Air Mass Trajectories Associated With The DC-8 Flights
gte_pemta_sgfvpdXX.zip:	Fast Response H_2O Measurements
gte_pemta_merge_dXX.zip:	Merged data files
gte_pemta_dc8_sat_trkm06.zip:	Selected Satellite Images with DC-8 Aircraft Flight Track

P3-B Aircraft:

gte_pemta_p3mXX.zip:	Aircraft Data
gte_pemta_p3btrajmXX.zip:	Backward Air Mass Trajectories Associated With the P-3B Flights
gte_pemta_merge_pXX.zip:	Merged data files
gte_pemta_sat_trk_p3bmXX.zip:	Selected Satellite Images with P3-B Aircraft Flight Track

Ancillary Measurements:

gte_pemta_ozonesondes_as.zip:	Ozone Sondes Launched From American Samoa
gte_pemta_ozonesondes_nz.zip:	Ozone Sondes Launched From New Zealand
gte_pemta_ozonesondes_ei.zip:	Ozone Sondes Launched From Easter Island
gte_pemta_ozonesondes_ta.zip:	Ozone Sondes Launched From Tahiti
gte_pemta_ozonesondes_fj.zip:	Ozone Sondes Launched From Fiji
gte_pemta_sst_1996_mmdd_MMDD.zip:	Equatorial Pacific Sea Surface Temperature Analysis for time period from month mm day dd to month MM day DD
gte_pemta_total_ozone.zip:	Total Ozone from TOMS
gte_pemta_g9wv_1996_mmdd.zip:	GOES-9 Water Vapor Satellite Images for month mm and day dd

gte_pemta_pre_1996_mmdd.zip:	SSM/I Rain Rate for month mm and day dd
gte_pemta_firecount_africa.zip:	Fire counts from AVHRR for Africa
gte_pemta_firecount_Austra.zip:	Fire counts from AVHRR for Australia
gte_pemta_firecount_samerica.zip:	Fire counts from AVHRR for South America
gte_pemta_radiosondes.zip:	Radiosonde Data

Model Results:

gte_pemta_dc8_modeling_amc.zip:	Air Mass Characterization
gte_pemta_dc8_modeling_hu_1min.zip:	Harvard point model calculations based upon 1-minute merge
gte_pemta_dc8_modeling_hu_hc.zip:	Harvard point model calculations based upon HC-merge
gte_pemta_dc8_modeling_hu_hno3.zip:	Harvard point model calculations based upon HNO3-merge

The following files are from AER's point model;

gte_pemta_dc8_modeling_aer1.zip:	fixed: acetone (400 ppm); H_2O_2 & MeOH (climatology)
gte_pemta_dc8_modeling_aer2.zip:	acetone (from CO correlation); H_2O_2 & MeOH (from climatology)
gte_pemta_dc8_modeling_aer3.zip:	fixed: acetone (from CO correlation); free: H2O2 & MeOH
gte_pemta_dc8_modeling_aer4.zip:	fixed: acetone = 0.0; free: H2O2 & MeOH

Acknowledgment

The investigators involved in the PEM Tropics A mission were funded by NASA. The funded investigators, their organization and grant, agreement or contract number was:

Area	Investigator	Organization	Number
Aircraft	B. Anderson	NASA Langley	N/A
	E. Atlas	NCAR	L-62926D
	A. Bandy	Drexel U	NAG-1-1770
	D. Blake	U of California-Irvine	NAG-1-1777
	J. Bradshaw	Georgia Tech	NAG-1-1767
	E. Browell	NASA Langley	N/A
	M. Carroll	U of Michigan	NAG-1-1755
	A. Clarke	U of Hawaii	NAG-1-176
	F. Eisele	Georgia Tech	NAG-1-1766
	G. Gregory	NASA Langley	N/A
	B. Heikes	U of Rhode Island	NAG-1-1757
	B. Hubert	U of Hawaii	NAG-1-1763
	M. Rodgers	Georgia Tech	NAG-1-1768
	G. Sachse	NASA Langley	N/A
	R. Shetter	NCAR	L-63198D
	H. Singh	NASA Ames	N/A
	R. Talbot	U of New Hampshire	NAG-1-1761
Modeling	D. Davis	Georgia Tech	NAG-1-1769
	D. Jacob	Harvard	NAG-1-1759
	T. Krishnamurti	Florida State U	NAG-1-1771
	D. Lenschow	NCAR	L-63196D
	S. Liu	Georgia Tech	NAG-1-1822
	R. Newell	Mass Inst of	NAG-1-1758

Area	Investigator	Organization	Number
		Tech	
	J. Rodriguez	AER, Inc.	NAS1-20592

Table of contents

1. Collection Overview

a. Collection Contents

The major objective of the PEM-Tropics A mission was to understand the factors controlling tropospheric ozone and its precursors (NOx, CO and hydrocarbons) over the South Pacific, and to assess the implications for the global oxidizing power of the atmosphere. A secondary objective was to improve the understanding of atmospheric sulfur chemistry over the Pacific. PEM-Tropics A was implemented with the NASA DC-8 and P-3B aircraft as the primary measurement platforms, supported by radiosonde and ozonesonde launches from sites in the South Pacific region. Airborne measurements were typically obtained at a constant altitude over the tropical Pacific during transit flights (i.e. "survey" flights), and over multiple altitudes closer to the intensive sites during flights from the intensive sites. Flight missions were conducted during PEM Tropics A from August 5, 1996 through October 5, 1996. Section 4.b lists the flight dates. Flight tracks are shown in Hoell et al., [1999]. The duration, altitude range, ascent and descent rate, and flight path for each mission varied depending on mission objectives and environmental conditions. Ground-based measurements were made at sites shown in Hoell et al., [1999]. The automated ground sites provided daily measurements during the time frame when airborne measurements were being made and weekly averaged samples before and after. Further information about the measurement region and time frame may be found in the Journal of Geophysical Research, Vol. 104, No. D5, 5567-5583, March 20, 1999, and PEM Tropics A, Part 2, Vol. 104, No. D13, July 20, 1999.

Data Set Introduction

This data set contains all of the data submitted to the GTE data archive by the PEM Tropics A investigators listed in Section 1.d and includes merges of the various measurements aboard each aircraft. Data from radiosondes launches, kinematic trajectories analysis, satellite images, and fire count are also included.

Summary of Parameters

Tables 1a and 1b from Hoell et al., [1999] list the DC-8 aircraft investigations and P-3B aircraft investigations, respectively. Table 1c also from Hoell et al., [1999] lists the modeling and meteorological investigations, along with the Mission Meteorologists and Scientists.

b. Related Data Collections

PEM Tropics A investigators have individually reported the results of their investigations in the Journal of Geophysical Research, Vol. 104, No. D5, March 20, 1999, and PEM Tropics A, Part 2, Vol. 104, No. D13, July 20, 1999.

There are data sets available from the Langley ASDC for 13 other GTE missions conducted from 1983 to 2001. See the GTE home page and/or ASDC GTE Data and Information page for a description of the available data.

c. Title of Investigation

Global Tropospheric Experiment Pacific Exploratory Mission Tropics A (PEM Tropics A)

d. Investigator Name and Title

If the person is known to be retired, deceased or no longer at their respective organization, it is noted and the contact information may be omitted. The contact information provided was current during the mission, but may no longer be current.

DC-8 Measurements Investigators

Investigator Area	Investigator Information
Ultra-fine and Fine Aerosols (Heated and Unheated)	Bruce Anderson Mail Stop 483 NASA Langley Research Center Hampton VA 23681-0001 Telephone: 757-864-5850 E-mail: bruce.e.anderson@nasa.gov
Alkyl Nitrates/Halocarbons	Elliot Atlas NCAR Atmospheric Chemistry Division P. O. Box 3000 1850 Table Mesa Drive Boulder CO 80307 Telephone: 303-497-1425 Fax: 303-497-1400 E-mail: atlas@acd.ucar.edu
DMS, SO_2	Alan R. Bandy Drexel University Department of Chemistry 32nd and Chestnut Street Philadelphia PA 19104 Telephone: 215-895-2640 Fax: 215-895-1980 E-mail: bandyar@drexel.edu
Airborne Meteorological/Position Data	John D. Barrick MS 483 NASA Langley Research Center Hampton VA 23681-0001 Telephone: 757-864-5831 Fax: 757-864-5841 E-mail: john.d.barrick@nasa.gov
Non-methane Hydrocarbons, Selected Halocarbons	Don Blake University of California-Irvine Department of Chemistry Irvine, CA 92717 Telephone: 949-824-4195 Fax: 949-824-2905 E-mail: drblake@uci.edu
NO, NO_2	John Bradshaw (deceased) Scott Sandholm (Co-I) Georgia Institute of Technology Earth and Atmospheric Sciences Baker Building, Room 107 923 Dalney Street Atlanta GA 30332-0340 Telephone: 404-894-3895/3824 Fax: 404-894-5073 ss27@prism.gatech.edu
Aerosol and Ozone Profiles	Edward V. Browell Mail Stop 401A

	NASA Langley Research Center Hampton VA 23681-0001 Telephone: 757-864-1273 Fax: 757-864-7790 E-mail: edward.v.browell@nasa.gov	
In-situ Ozone	Gerald L. Gregory (retired) NASA Langley Research Center	
Hydrogen Peroxide (H_2O_2) and Methyl-Hydroperoxide (CH_3OOH)	Brian G. Heikes University of Rhode Island Graduate School of Oceanography South Ferry Road Narragansett RI 02882-1197 Telephone: 401-874-6638 Fax: 401-874-6898 E-mail: bheikes@gso.uri.edu	
CO, CH_4, CO_2, H_2O	Glen W. Sachse - CO, CH_4, H_2O MS 483 NASA Langley Research Center Hampton VA 23681-0001 Telephone: 757-864-1566 Fax: 757-864-8818 E-mail: glen.w.sachse@nasa.gov	Stephanie Vay - measurement of carbon dioxide MS 483 NASA Langley Research Center Hampton VA 23681-0001 Telephone: 757-864-1574 Fax: 757-864-5841 E-mail: stephanie.a.vay@nasa.gov
Photolysis Rate Coefficients and Total Solar Actinic Flux as a Function of Wavelength	Richard Shetter NCAR Atmospheric Chemistry Division 1850 Table Mesa Drive Boulder CO 80303 Telephone: 303-497-1420 Fax: 303-497-1400 E-mail: shetter@ncar.ucar.edu	
PAN, PPN, C_2Cl_4, CH_3ONO_2, C_2H_5OH, Ethyl-i-propyl nitrate	Hanwant Singh NASA Ames Research Center Singh Group Mail Stop 245-5 Moffett Field CA 94035 Telephone: 650-604-6769 E-mail: hanwant.b.singh@nasa.gov	
HNO_3, HCOOH, CH_3COOH, Aerosol ions	Robert W. Talbot University of New Hampshire Institute of Earth, Oceans, Space Morse Hall Complex Systems Research Center Durham NH 03820 Telephone: 603-862-1546 Fax: 603-862-0188 E-mail: rwt@christa.unh.edu	

P-3B Measurements Investigators

Investigator Area	Investigator Information
Turbulent Air Motion Sensor and Lyman Alpha	Bruce Anderson (See prior listing under DC-8)
Alkyl Nitrates/Halocarbons	Elliot Atlas (See prior listing under DC-8)
DMS, SO_2	Alan R. Bandy (See prior listing under DC-8)
Airborne Meteorological/Position Data	John D. Barrick (See prior listing under DC-8)
Non-methane Hydrocarbons, Selected Halocarbons	Don Blake (See prior listing under DC-8)M
NO, O_3	Mary Anne Carroll University of Michigan

	Atmospheric, Oceanic and Space Sciences 2455 Hayward Ann Arbor MI 48109-2143 Telephone: 313-763-4066 Fax: 313-764-5137 E-mail: mcarroll@umich.edu
Dry aerosol nuclei concentrations, light scattering, surface area, and volume	Antony Clarke University of Hawaii Dept. Of Oceanography 1000 Pope Road Honolulu HI 96822 Telephone: 808-956-6215 Fax: 808-956-7112 E-mail: tclarke@soest.hawaii.edu
OH, H_2SO_4, MSA	Fred Eisele Georgia Institute of Technology 1850 Table Mesa Drive Boulder Co 80303 Telephone: 303-497-1483 E-mail: fred.eisele@eas.gatech.edu
H_2O_2, CH_3OOH	Brian G. Heikes (See prior listing under DC-8)
$j(NO_2)$, $j(O^1D)$	Mike Rodgers Georgia Institute of Technology School of Earth and Atmospheric Sciences Hinman Building, Room 312 723 Research Drive Atlanta GA 30332-0340 Telephone: 404-894-5609 E-mail: michael.rodgers@eas.gatech.edu
Investigator for Aerosol NSS, MS, vapor HNO_3	Barry Huebert University of Hawaii Department of Oceanography School of Ocean and Earth Science Technology 1000 Pope Road Honolulu HI 96822 Telephone: 808-956-6896 E-mail: huebert@soest.hawaii.edu
Carbon Monoxide, Methane and Carbon Dioxide	Glen W. Sachse Responsible for CO and CH_4 Stephanie Vay Responsible for CO_2 (See prior listings under DC-8)

Model Investigators

Investigator Area	Investigator Information
Instantaneous Photostationary State & Time Dependent Box Models and P-3B Co-Mission Scientist	Douglas Davis Georgia Institute of Technology School of Earth and Atmospheric Sciences Room 108 221 Bobby Dodd Way Atlanta GA 30332-0340 Telephone: 404-894-9565 E-mail: dd16@prism.gatech.edu
Real Time & Post Mission Trajectory Models Analysis and DC-8 Co-Mission Meteorologist	Henry Fuelberg Florida State University Dept. Of Meteorology Tallahassee FL 32306-4520 Telephone: 850-644-6466 E-mail: hfuelberg@fsu.edu
FSU Global Spectral Model	T. Krishnamurti Florida State University Department of Meteorology Tallahassee FL 32306-4520

	Telephone: 850-644-2210 E-mail: krish@met.fsu.edu
Photochemical Point Model and DC-8 Co-Mission Scientist	Daniel Jacob Harvard University Department of Engineering and Applied Sciences Pierce Hall, Room 109A 29 Oxford Street Cambridge MA 02138 Telephone: 617-495-1794 E-mail: djj@io.harvard.edu
Analysis of Trace Gas Flux Measurements	Don Lenschow NCAR P. O. Box 3000 3450 Mitchell Lane Boulder CO 80307-3000 Telephone: 303-497-8903 E-mail: lenschow@ncar.ucar.edu
Three Dimensional Transport, Photochemical Model	Shaw Liu (no longer at GA Tech) Institute of Earth Sciences Academia Sinica PO Box 1-55, Nankang Taipei, Taiwan 11529 ROC Telephone: 886-2-2783-9910 ext.407 E-mail: shaw.liu@eas.gatech.edu
Chemical & Meteorological Analysis and P-3B Co-Mission Meteorologist	Reginald Newell (deceased 12/27/02) Massachusetts Institute of Technology Earth, Atmospheric and Planetary Sciences
Point-by-Point Photochemical Model, Steady State Diurnal Model and Trajectory Photochemical Process Model	Jose Rodriguez (no longer with AER) N. D. Sze (Co-I) A.E.R. Inc. 840 Memorial Drive Cambridge MA 02139 Telephone: 781-761-2288 E-mail: nsze@aer.com

e. Technical Contact(s)

The following persons have more specialized knowledge about the data in the data sets or in their field or general knowledge about the mission, its execution and the data sets.

Investigator or Knowledge Area	Investigator and Contact Information	
Measurements for DMS, SO_2 on the DC-8 and P-3B	Donald C. Thornton Drexel University Department of Chemistry 32nd and Chestnut Street Philadelphia PA 19104	
PEM Tropics A P-3B Mission Scientist	Douglas D. Davis (See prior listing under Modelers above)	
PEM Tropics A DC-8 Mission Co-Scientists	Daniel Jacob and Mike Rodgers (See prior listings under Modelers and P-3B above)	
PEM Tropics B Program Manager	Robert J. McNeal (retired)	
PEM Tropics B Project Manager	James M. Hoell, Jr. (retired) NASA Langley Research Center	
PEM Tropics B Mission Meteorologists	Reginald Newell & Henry Fuelberg (See prior listings in Modelers above)	
PEM Tropics B Expedition Manager	Richard J. Bendura (retired) NASA Langley Research Center	
DC-8 Aircraft Manager	Chris Scofield NASA Ames Research Center Mailstop 211-12 Moffett Field CA 94035 Telephone: 415-604-4599 E-mail: cscofield@mail.arc.nasa.gov	Airborne Science Program Office MS D1623H Edwards, CA 93523-0273 Telephone: (650) 604-4388

P-3B Aircraft Manager	Dave Pierce NASA Wallops Flight Facility Mailcode 820.0 Wallops Island VA 23337-5099 Telephone: 757-824-1453 E-mail: david.l.pierce@nasa.gov	Wallops Flight Facility Aircraft Office NASA Wallops Flight Facility Wallops Island VA 23337-5099 Telephone: 757-824-1529
Logistics	Mike Cadena NASA Landgley Research Center Mail Stop 927 Hampton VA 23681 Telephone: 757-827-4860 E-mail: michael.j.cadena@nasa.gov	Fred Reisinger (no longer with SAIC)
Experiment Integration	**P-3B:** James L. Raper, Sr. (retired) NASA Langley Research Center	**DC-8:** James M. Hoell, Jr. (retired) NASA Langley Research Center
PEM Tropics B Data Manager	James L. Raper, Sr. (retired) NASA Langley Research Center	

2. APPLICATIONS AND DERIVATION

Potential usage and applications of the described data sets can be seen in the articles that comprise the Journal of Geophysical Research PEM Tropics A Special Sections (Vol. 104 No. D5 and D13, March 20 and July 20, 1999.

a. Calculated Variables

For convenience of the users, the equations used to calculate project provided variables Mach Number (M), Static Air Temperature (Ts), True Air Speed (TAS), Potential Temperature (θ), Vapor Pressure (e), Specific Humidity (q), Mixing Ratio (r), and Relative Humidity (%) are given below.

Mach Number, M:

$$M = \sqrt{5 * \left[\left(\frac{Q_c}{P_s} + 1 \right)^{(2/7)} - 1 \right]}$$

M = Mach Number
Ps = Static Pressure
Qc = Differential Pressure

Static Air Temperature, Ts:

$$T_s(^\circ K) = \frac{T_T}{\left[1 + M^2 * \left(\frac{\gamma - 1}{2} \right) \right]}$$

T_S = Static Air Temperature (°K)
T_T = Total Air Temperature (°K)
γ = 1.4, ratio of specific heat of air at constant pressure and volume

True Air Speed, TAS:

$$TAS(kts) = M * a = M * 38.96695 * \sqrt{T_s}$$

TAS = True Air Speed (knots)
T_S = Static Air Temperature (°K)
M = Mach Number
a = Speed of Sound

Potential Temperature, θ:

$$\theta(^\circ K) = T_s * \left(\frac{1000}{P_s} \right)^{0.2857142}$$

θ = Potential Temperature (°K)
T_S = Static Air Temperature (°K)
Ps = Static Pressure (mb)

Vapor Pressure, e :

e_{water} (mb) = [1.0007 + (3.46 * 10^{-6} * P_S)] * 6.1121* EXP[17.502 * T/(240.97 + T)]

e_{ice} (mb) = [1.0003 + (4.18 * 10^{-6} * P_S)] * 6.1115* EXP[22.452 * T/(272.55 + T)]

e = Partial Pressure of Water Vapor (mb)
P_S = Static Pressure (mb)
T = Static Air Temperature (°C) for Saturation Vapor Pressure
or
T = Dew/Frost Point (°C) for Partial Pressure of Water Vapor

Note:

1. ProjDP of zero or greater should be used to derive the partial pressure of water vapor w.r.t water (e_{water}) and the ProjDP less than zero should be used to derive the partial pressure of water vapor w.r.t ice (e_{ice}).

2. StatTempDegC and ProjDP parameters recorded in the P-3B data set are substituted to calculate saturation vapor pressure and partial pressure of water vapor, respectively.

3. TSDEGC and ProjDP parameters recorded in the DC-8 data set are substituted to calculate saturation vapor pressure and partial pressure of water vapor, respectively. Also notice in the DC-8 data set there is a redundant static air temperature measurement, TSCALC, which is calculated by DADS. Although TSDEGC and TSCALC track closely they can diverge by ? 1° at the low and high ends of the measurement range.

Specific Humidity, q:

$$q(g/kg) = \frac{0.622 * 10^3 * e}{(P_s - 0.377e)} \qquad q(ppmw) = \frac{0.622 * 10^6 * e}{(P_s - 0.377e)}$$

Mixing Ratio, r:

$$r(g/kg) = \frac{0.622 * 10^3 * e}{(P_s - e)} \qquad r(ppmw) = \frac{0.622 * 10^6 * e}{(P_s - e)}$$

Note:
ppmv = 1.608 * ppmw
ppmw = 0.622 * ppmv

Relative Humidity, %:

w.r.t. water,

$$RH_{water} = \frac{e_{water}}{e_{S_{water}}} * 100$$

w.r.t. ice,

$$RH_{ice} = \frac{e_{ice}}{e_{S_{ice}}} * 100$$

b. Graphs and Plots:

Interested readers should see the Journal of Geophysical Research, Vol.104, No.D5, March 20, 1999 and documents therein, for plots and the results of analysis of data.

3. DATA DESCRIPTION AND ACCESS

a. Format

See the GTE Data Format Document.

b. Data Organization

Granularity

A general description of data granularity as it applies to the IMS appears in the EOSDIS Glossary. Aircraft data sets are available for each investigation for each flight.

c. Data Collection Status and Plans

All measurements aboard the DC-8 and P-3B aircraft, ozonesonde and radiosondes data for the PEM Tropics A mission are contained in the archive. Additionally kinematic backward air mass trajectories, satellite images, aircraft data merge to common time periods, and fire count data are also available in the archive. No additional data products relevant to PEM Tropics A are anticipated.

d. Data Access

This data is available online or on a CDROM via the LaRC ASDC on the GTE Data and Information page. Additional information on PEM-Tropics A and other GTE field missions can be found on the GTE home page.

e. Data Archive Center

The Atmospheric Science Data Center at NASA's Langley Research Center.

Contacts for Data Center or Data Access Information:

User and Data Services Group
Atmospheric Science Data Center
MS 157D
Langley Research Center
Hampton, VA 23681 USA
Phone: 757-864-8656
Fax: 757-864-8807
E-mail: support-asdc@earthdata.nasa.gov
Internet: http://eosweb.larc.nasa.gov

f. How to Cite the Data Collection

Publication of a portion(s) of the data archive should acknowledge the principal investigator(s) responsible for the data by referencing the appropriate manuscript in the Journal of Geophysical Research, Vol. 104, No. D5, March 20, 1999, and PEM Tropics A, Part 2, Vol. 104, No. D13, July 20, 1999.

4. DATA CHARACTERISTICS:

a. Study Area

Airborne measurements were made over the central Pacific, as indicated in Hoell et al., [1999]. A more detailed description of the environmental characteristics for the experiment region is provided in the papers included in the Journal of Geophysical Research, Vol. 104, No. D5, March 20, 1999, and PEM Tropics A, Part 2, Vol. 104, No. D13, July 20, 1999. Additional information may be found in other publications authored by the principal investigators or on the GTE homepage.

Spatial Coverage

Hoell et al., [1999] shows flight missions that were conducted during PEM Tropics A. The duration, altitude range, assent and descent rate, and flight path of each mission varied depending on mission objective and environmental conditions. The nominal air speed ranged from 500 knots (approximately 575 mph) at 13 km altitude for the DC-8 to 270 knots (approximately 310 mph) at 8 km for the P-3B. Intensive measurement regions and aircraft flight paths, along which measurements were also made, are shown in papers in the PEM Tropics B Special Section, Journal of Geophysical Research, Vol. 104, No. D5, March 20, 1999.

Data Set	Min Lat	Max Lat	Min Lon	Max Lon
Measurements onboard the DC-8	-73S	45N	-109E	153E
Measurements onboard the P-3B	-35S	39N	-165E	-75E

Ozonesonde station	Latitude	Longitude
Fiji	18.10S	178.20E
New Zealand	45.05S	169.68E
Samoa	14.23S	170.56W
Tahiti	18.00S	149.00W
Easter Island	27.17S	109.42W

Spatial and Temporal Resolution

Resolution varies for each measurement. See the DC-8 and P-3B Instrument Characteristics Tables from Hoell et al., [1999] for the nominal characteristics of the instruments aboard each aircraft. The file header records associated with each data file will provide additional information.

Grid Description

No data gridding or binning of data to a geographic grid occurred during data processing.

b. Temporal Coverage

Thirty-five aircraft missions were conducted from August 5 to October 5, 1996. (17 for the DC-8 and 18 for the P-3B. See Hoell et al., [1999] for additional information.)

Data Set	Begin Date	End Date
Measurements onboard the DC-8	August 30, 1996	October 5, 1996
Measurements onboard the P-3B	August 5, 1996	September 26, 1996
Sondes Data	January 4, 1995	December 30, 1997

Ozonesonde Station	Begin Date	End Date
Fiji	February 6, 1997	December 26, 1997
New Zealand	January 4, 1995	December 30, 1997
Samoa	August 8, 1995	December 18, 1997
Tahiti	July 31, 1995	October 7, 1997
Easter Island	August 20, 1995	June 28, 1997

c. Parameter or Variable

Not all of the parameters are in each data set granule. Also, the ranges vary between data sets and between granules within each data set. Tables 1a and 1b from Hoell et al., [1999] list the investigators and measurements made aboard the DC-8 aircraft and P-3B aircraft, respectively.

Parameter Description

The variables measured are standard atmospheric, chemical and meteorological species requiring no further elaboration here.

Unit of Measurement

The units of measure vary widely depending on species and measurement environment and are addressed in the individual papers for each investigation included in the Journal of Geophysical Research, Vol. 104, No. D5, March 20,1999, and PEM Tropics A, Part 2, Vol. 104, No. D13, July 20, 1999.

Parameter Source

The instruments used in making the measurements are listed the DC-8 and P-3B Instrument Characteristics Tables from Hoell et al., [1999].

Parameter Range

The ranges of data vary widely depending on species and measurement environment and are addressed in the individual papers for each investigation included in the Journal of Geophysical Research, Vol. 104, No. D5, March 20,1999, and PEM Tropics A, Part 2, Vol. 104, No. D13, July 20, 1999.

Sample Data Record

The GTE Data Format Document contains examples of each data set type.

5. USAGE GUIDANCE

a. **Known Problems with the Data**

None reported for the current archive version. See readme files and/or header records included with each data set for information provided by the responsible investigator.

b. **Future Modifications and Plans**

The data sets submitted to the ASDC are considered final and no further updates are anticipated.

6. ACQUISITION MATERIALS AND METHODS

Details of data acquisition and materials are addressed in the papers contained in the Journal of Geophysical Research PEM Tropics-A Special Issue (Vol. 104, No. D5 and D13, March 20 and July 20, 1999.

7. REFERENCES

GTE Bibliography: Citations for publications, presentations, and media coverage

Hoell, J. M., D. D. Davis, D. J. Jacob, M. O. Rodgers, R. E. Newell, H. E. Fuelberg, R. J. McNeal, J. L. Raper, and R. J. Bendura, Pacific Exploratory Mission in the tropical Pacific: PEM-Tropics A, August-September 1996, J. Geophys. Res., Vol. 104, No. D2, 5567-5583, 20 March, 1999.

PEM Tropics A Special Section, Journal of Geophysical Research, Vol. 104, No. D5, March 20, 1999, and PEM Tropics A, Part 2, Vol. 104, No. D13, July 20, 1999.

8. ACRONYMS

AER - Atmospheric and Environmental Research
ASDC - Atmospheric Science Data Center
DADS - Data Acquisition and Display System
DFRC - Dryden Flight Research Center
EOSDIS - Earth Observing System Data and Information System
GTE - Global Tropospheric Experiment
IMS - Information Management System
NASA - National Aeronautical and Space Administration
PEM - Pacific Exploratory Mission
ProjDP - Project Dew Point
TSCALC - Static temperature, calculated by DADS
TSDEGC - Static temperature, measured directly, in Celsius
WFF - Wallops Flight Facility

9. Document Information

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